

What is claimed is:

- 1 1. A method for creating a color transformation table  
2 correlating a color signal outputted from a color input  
3 device in a color space of said color input device  
4 (hereinafter referred to as a transformation source  
5 color space) with a color signal in a color space  
6 (hereinafter referred to as a transformation target  
7 color space) which is different from said  
8 transformation source color space, comprising the  
9 steps of:  
10       a dividing step of beforehand defining a  
11 plurality of regions obtained by dividing the whole  
12 of said transformation target color space; and  
13       a color transformation table creating step of  
14 creating said color transformation table by using a  
15 plurality of color transformation formulas  
16 corresponding to said plural regions, respectively,  
17 said plural regions being defined at said dividing  
18 step.
- 1 2. The color transformation table creating method  
2 according to claim 1 further comprising the steps of:  
3       a reading step of reading a plurality of color  
4 regions on a color chart by said color input device,  
5 and outputting a color signal in said transformation  
6 target color space corresponding to each of said color

7 regions from said color input device;  
8 a colorimetric step of measuring said  
9 plurality of color regions by a colorimeter, and  
10 outputting spectral reflectance corresponding to each  
11 of said color regions from said colorimeter;  
12 a classifying step of classifying said  
13 spectral reflectance according to which region among  
14 said plural regions in said transformation target color  
15 space a color signal in said transformation target  
16 color space corresponding to said spectral reflectance  
17 belongs to; and  
18 a spectral characteristics estimating step of  
19 estimating spectral characteristics of said color  
20 input device on the basis of said color signal outputted  
21 from said color input device at said reading step and  
22 said spectral reflectance outputted from said  
23 colorimeter at said colorimetric step;  
24 wherein, at said color transformation table  
25 creating step, said color transformation formula is  
26 created for each of said regions in said transformation  
27 target color space on the basis of said spectral  
28 reflectance classified at said classifying step and  
29 said spectral characteristics estimated at said  
30 spectral characteristics estimating step.

1 3. The color transformation table creating method  
2 according to claim 1, wherein said color transformation

3 table creating step comprises:  
4 a relationship creating step of creating a  
5 relationship between a color signal in said  
6 transformation source color space and a color signal  
7 in said transformation target color space by using said  
8 color transformation formula according to each region,  
9 for each of said color transformation formulas; and  
10 a creation processing step of creating said  
11 color transformation table on the basis of said  
12 relationship created for each of said color  
13 transformation formulas at said relationship creating  
14 step.

1 4. The color transformation table creating method  
2 according to claim 2, wherein said color transformation  
3 table creating step comprises:  
4 a relationship creating step of creating a  
5 relationship between a color signal in said  
6 transformation source color space and a color signal  
7 in said transformation target color space by using said  
8 color transformation formula according to each region,  
9 for each of said color transformation formulas; and  
10 a creation processing step of creating said  
11 color transformation table on the basis of said  
12 relationship created for each of said color  
13 transformation formulas at said relationship creating  
14 step.

1 5. The color transformation table creating method  
2 according to claim 1, wherein said transformation  
3 target color space is a uniform color space.

1 6. The color transformation table creating method  
2 according to claim 1, wherein said plural regions have  
3 regions overlapping on each other.

1 7. The color transformation table creating method  
2 according to claim 1, wherein, at said dividing step,  
3 the whole of said transformation target color space  
4 is divided according to hue angle to provide said plural  
5 regions.

1 8. The color transformation table creating method  
2 according to claim 1, wherein, at said dividing step,  
3 the whole of said transformation target color space  
4 is divided according to chroma to provide said plural  
5 regions.

1 9. The color transformation table creating method  
2 according to claim 1, wherein, at said dividing step,  
3 the whole of said transformation target color space  
4 is divided according to lightness to provide said  
5 plural regions.

1 10. The color transformation table creating method  
2 according to claim 3, wherein said color transformation  
3 table creating step further comprises a determining  
4 step of determining that a color transformation result  
5 is correct when said color transformation result, into  
6 which one color signal in said transformation source  
7 color space is transformed through a color  
8 transformation formula when said relationship is  
9 created at said relationship creating step, belongs  
10 to a region corresponding to said color transformation  
11 formula;

12 wherein, at said creation processing step,  
13 said color transformation table is created on the basis  
14 of said color transformation result determined to be  
15 correct at said determining step.

1 11. The color transformation table creating method  
2 according to claim 4, wherein said color transformation  
3 table creating step further comprises a determining  
4 step of determining that a color transformation result  
5 is correct when said color transformation result, into  
6 which one color signal in said transformation source  
7 color space is transformed through a color  
8 transformation formula when said relationship is  
9 created at said relationship creating step, belongs  
10 to a region corresponding to said color transformation  
11 formula;

12            wherein, at said creation processing step,  
13    said color transformation table is created on the basis  
14    of said color transformation result determined to be  
15    correct at said determining step.

1    12. The color transformation table creating method  
2    according to claim 10, wherein when there are a  
3    plurality of color transformation results determined  
4    to be correct with respect to said one color signal  
5    at said determining step, a color transformation result  
6    with respect to said one color signal is calculated  
7    at said creation processing step on the basis of values  
8    relating to distances between said plural color  
9    transformation results determined to be correct and  
10   boundaries of said regions to which said plural color  
11   transformation results belong.

1    13. The color transformation table creating method  
2    according to claim 11, wherein when there are a  
3    plurality of color transformation results determined  
4    to be correct with respect to said one color signal  
5    at said determining step, a color transformation result  
6    with respect to said one color signal is calculated  
7    at said creation processing step on the basis of values  
8    relating to distances between said plural color  
9    transformation results determined to be correct and  
10   boundaries of said regions to which said plural color

11 transformation results belong.

1 14. The color transformation table creating method  
2 according to claim 10, wherein when there are a  
3 plurality of color transformation results with respect  
4 to said one color signal determined to be correct at  
5 said determining step, one of said plural color  
6 transformation results determined to be correct is  
7 selected as a color transformation result with respect  
8 to said one color signal at said creation processing  
9 step on the basis of values relating to distances  
10 between said plural color transformation results  
11 determined to be correct and boundaries of said regions  
12 to which said plural color transformation results  
13 belong.

1 15. The color transformation table creating method  
2 according to claim 11, wherein when there are a  
3 plurality of color transformation results with respect  
4 to said one color signal determined to be correct at  
5 said determining step, one of said plural color  
6 transformation results determined to be correct is  
7 selected as a color transformation result with respect  
8 to said one color signal at said creation processing  
9 step on the basis of values relating to distances  
10 between said plural color transformation results  
11 determined to be correct and boundaries of said regions

12 to which said plural color transformation results  
13 belong.

1 16. The color transformation table creating method  
2 according to claim 10, wherein when there is no color  
3 transformation result with respect to said one color  
4 signal determined to be correct at said determining  
5 step, a color transformation result with respect to  
6 said color signal is calculated at said creation  
7 processing step on the basis of reciprocals of values  
8 relating to distances between said plural color  
9 transformation results obtained with respect to said  
10 color signal at said relationship creating step and  
11 boundaries of said regions to which said respective  
12 color transformation results belong.

1 17. The color transformation table creating method  
2 according to claim 11, wherein when there is no color  
3 transformation result with respect to said one color  
4 signal determined to be correct at said determining  
5 step, a color transformation result with respect to  
6 said color signal is calculated at said creation  
7 processing step on the basis of reciprocals of values  
8 relating to distances between said plural color  
9 transformation results obtained with respect to said  
10 color signal at said relationship creating step and  
11 boundaries of said regions to which said respective



12 color transformation results belong.

1 18. The color transformation table creating method  
2 according to claim 10, wherein there is no color  
3 transformation result with respect to said one color  
4 signal determined to be correct at said determining  
5 step, one of a plurality of color transformation  
6 results is selected as a color transformation result  
7 with respect to said one color signal at said creation  
8 processing step on the basis of reciprocals of values  
9 relating to distances between said plural color  
10 transformation results obtained with respect to said  
11 color signal at said relationship creating step and  
12 boundaries of said regions to which said plural color  
13 transformation results belong.

1 19. The color transformation table creating method  
2 according to claim 11, wherein there is no color  
3 transformation result with respect to said one color  
4 signal determined to be correct at said determining  
5 step, one of a plurality of color transformation  
6 results is selected as a color transformation result  
7 with respect to said one color signal at said creation  
8 processing step on the basis of reciprocals of values  
9 relating to distances between said plural color  
10 transformation results obtained with respect to said  
11 color signal at said relationship creating step and

12 boundaries of said regions to which said plural color  
13 transformation results belong.

1 20. The color transformation table creating method  
2 according to claim 10, wherein said color  
3 transformation table correlates a color signal in said  
4 transformation source color space with spectral  
5 reflectance according to a color transformation result  
6 as a color signal in said transformation target color  
7 space.

1 21. The color transformation table creating method  
2 according to claim 11, wherein said color  
3 transformation table correlates a color signal in said  
4 transformation source color space with spectral  
5 reflectance according to a color transformation result  
6 as a color signal in said transformation destination  
7 color space.

1 22. The color transformation table creating method  
2 according to claim 20, wherein when there are a  
3 plurality of color transformation results with respect  
4 to said one color signal determined to be correct at  
5 said determining step, spectral reflectance of said  
6 one color signal is calculated at said creation  
7 processing step on the basis of values relating to  
8 distances between said plural color transformation

9 results determined to be correct and boundaries of said  
10 regions to which said plural color transformation  
11 results belong.

1 23. The color transformation table creating method  
2 according to claim 21, wherein when there are a  
3 plurality of color transformation results with respect  
4 to said one color signal determined to be correct at  
5 said determining step, spectral reflectance of said  
6 one color signal is calculated at said creation  
7 processing step on the basis of values relating to  
8 distances between said plural color transformation  
9 results determined to be correct and boundaries of said  
10 regions to which said plural color transformation  
11 results belong.

1 24. An apparatus for creating a color transformation  
2 table correlating a color signal outputted from a color  
3 input device in a color space (hereinafter referred  
4 to as a transformation source color space) of said color  
5 input device with a color signal in a color space  
6 (hereinafter referred to as a transformation target  
7 color space) which is different from said  
8 transformation source color space, comprising:  
9 a color transformation table creation unit for  
10 creating said color transformation table by using a  
11 plurality of color transformation formulas

12 corresponding to a plurality of regions, respectively,  
13 said regions being obtained by dividing said  
14 transformation target color space.

1 25. The color transformation table creating apparatus  
2 according to claim 24 further comprising:

3 an input unit for inputting a color signal in  
4 said transformation source color space corresponding  
5 to each of a plurality of color regions on a color chart,  
6 said color signal being obtained by reading said color  
7 regions by said color input device;

8 a colorimeter for measuring said plurality of  
9 color regions to obtain spectral reflectance  
10 corresponding to each of said color regions;

11 a classification unit for classifying said  
12 spectral reflectance according to which region among  
13 said plural regions in said transformation target color  
14 space a color signal in said transformation target  
15 color space corresponding to said spectral reflectance  
16 belongs to; and

17 a spectral characteristics estimation unit for  
18 estimating spectral characteristics of said color  
19 input device on the basis of said color signal inputted  
20 from said input unit and said spectral reflectance  
21 obtained by said colorimeter;

22 wherein said color transformation table  
23 creation unit creates a color transformation formula

24 for each of said regions in said transformation target  
25 color space on the basis of said spectral reflectance  
26 classified by said classification unit and said  
27 spectral characteristics estimated by said spectral  
28 characteristics estimation unit.

1 26. The color transformation table creating apparatus  
2 according to claim 24, wherein said color  
3 transformation table creating unit comprises:

4 a relationship creation unit for creating a  
5 relationship between a color signal in said  
6 transformation source color space and a color signal  
7 in said transformation target color space by using said  
8 color transformation formula according to each region,  
9 for each of said color transformation formulas; and

10 a creation process unit for obtaining a  
11 relationship on the basis of plural relationships  
12 created by using said plural color transformation  
13 formulas in said relationship creation unit to create  
14 said color transformation table.

1 27. The color transformation table creating apparatus  
2 according to claim 25, wherein said color  
3 transformation table creating unit comprises:

4 a relationship creation unit for creating a  
5 relationship between a color signal in said  
6 transformation source color space and a color signal

7 in said transformation target color space by using said  
8 color transformation formula according to each region,  
9 for each of said color transformation formulas; and  
10 a creation process unit for obtaining a  
11 relationship on the basis of plural relationships  
12 created by using said plural color transformation  
13 formulas in said relationship creation unit to create  
14 said color transformation table.

1 28. A computer readable record medium in which a color  
2 transformation table creating program for making a  
3 computer realize a function of creating a color  
4 transformation table correlating a color signal  
5 outputted from a color input device in a color space  
6 of said color input device (hereinafter referred to  
7 as a transformation source color space) with a color  
8 signal in a color space (hereinafter referred to as  
9 a transformation target color space) which is different  
10 from said transformation source color space is  
11 recorded;

12 said color transformation table creating  
13 program making said computer function as:

14 a color transformation table creation  
15 unit for creating said color transformation table by  
16 using a plurality of color transformation formulas  
17 corresponding to a plurality of regions, respectively,  
18 said regions being obtained by dividing said

19 transformation target color space.

1 29. The computer readable record medium in which a  
2 color transformation table creating program is  
3 recorded according to claim 28, wherein said color  
4 transformation table creating program makes said  
5 computer further function as:

6 a classification unit for classifying spectral  
7 reflectance according to which region among said plural  
8 regions in said transformation target color space a  
9 color signal in said transformation target color space  
10 corresponding to said spectral reflectance belongs to,  
11 said spectral reflectance being obtained by measuring  
12 each of a plurality of color regions on a color chart  
13 by a colorimeter; and

14 a spectral characteristics estimation unit for  
15 estimating spectral characteristics of said color  
16 input device on the basis of a color signal in said  
17 transformation target color space obtained for each  
18 of said color regions by reading said plurality of color  
19 regions by said color input device and said spectral  
20 reflectance obtained by said colorimeter;

21 wherein when said color transformation table  
22 creating program makes said computer function as said  
23 color transformation table creation unit, said color  
24 transformation formula is created for each of said  
25 regions in said transformation target color space on

26 the basis of said spectral reflectance classified by  
27 said classification unit and said spectral  
28 characteristics estimated by said spectral  
29 characteristics estimation unit.

1 30. The computer readable record medium in which a  
2 color transformation table creating program is  
3 recorded according to claim 28, wherein when said color  
4 transformation table creating program makes said  
5 computer function as said color transformation table  
6 creation unit, said color transformation table  
7 creating program makes said computer function as:

8 a relationship creation unit for creating a  
9 relationship between a color signal in said  
10 transformation source color space and a color signal  
11 in said transformation target color space by using said  
12 color transformation formula according to each of said  
13 regions, for each of said color transformation  
14 formulas; and

15 a creation process unit for obtaining a  
16 relationship on the basis of plural relationships  
17 created by using said plural color transformation  
18 formulas in said relationship creation unit to create  
19 said color transformation table.

1 31. The computer readable record medium in which a  
2 color transformation table creating program is



3 recorded according to claim 29, wherein when said color  
4 transformation table creating program makes said  
5 computer function as said color transformation table  
6 creation unit, said color transformation table  
7 creating program makes said computer function as:  
8 a relationship creation unit for creating a  
9 relationship between a color signal in said  
10 transformation source color space and a color signal  
11 in said transformation target color space by using said  
12 color transformation formula according to each of said  
13 regions, for each of said color transformation  
14 formulas; and  
15 a creation process unit for obtaining a  
16 relationship on the basis of plural relationships  
17 created by using said plural color transformation  
18 formulas in said relationship creation unit to create  
19 said color transformation table.